

Pre-hospital Intubation by Paramedics: DRAFT Consensus Statement

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Introduction

Endotracheal intubation is performed by paramedics in a variety of settings within the United Kingdom; this consensus statement aims to provide guidance on the College's position in relation to the practice of pre-hospital endotracheal intubation by paramedics.

Background

Endotracheal intubation (ETI) has been considered a core skill for all paramedics since the inception of the profession in the 1980's and continues to be taught within the majority of pre-registration paramedic training programmes. In recent years the practice of intubation by paramedics has been widely debated. With greater availability of supraglottic airway devices (SAD), guidance provided by both the Joint Royal Colleges Ambulance Liaison Committee (JRCALC) and Resuscitation Council (RC) has shifted the emphasis to the primary use of such devices rather than intubation in most patients, reducing the opportunity for paramedics intubate in clinical practice.

In the transition from vocational Institute of Health and Care Development (IHCD) national paramedic training to pre-registration programmes delivered within Higher Education Institutions (HEI's) the standards of both training and assessment of competence in intubation now vary considerably; this has been compounded by reduced opportunities for supervised clinical practice within the operating theatre environment.

The numbers of intubations performed by paramedics has decreased due to the introduction of supraglottic airway device (SAD) and the practice of not commencing CPR and therefore advanced airway management, in patients with poor prognosis from resuscitation. A self-reported survey of 1056 paramedics in the UK found that the number of intubations attempts, per paramedic, per year ranged from 0 – 11, with the median of three a year (Lower Quartile Range =1, Upper Quartile Range =5)¹.

Paramedic intubation in the United Kingdom is generally undertaken without the administration of drugs. As a result of this the majority of patients who are intubated will either be in respiratory or cardiac arrest. The optimal method for managing the airway in out-of-hospital cardiac arrest (OHCA) is not known. However the AIRWAYS-2 randomised controlled trial seeks to address the question of which method of airway management (i-gel SGA versus tracheal intubation) increases the likelihood of survival to discharge with a favourable neurological outcome from OHCA, although the initial results from this trial will not be available until spring 2018. <http://www.airways-2.bristol.ac.uk/>

Paramedics work in a variety of clinical services and settings ranging from conventional NHS Ambulance Services, hospital and acute care settings, the military, private ambulance providers,

remote, off-shore and event medicine; each of which poses its own challenges both in terms of exposure to patients where tracheal intubation may be required and the opportunities available for ongoing training and assessment of competence.

Definition of terminology

- Intubation attempt: The insertion of a laryngoscope into the airway cavity to gain a view of the laryngeal inlet, with the intention of passing a tracheal tube through the inlet and into the trachea
- Successful intubation: The passage of a tracheal tube through the vocal cords and into the trachea with confirmation of tube placement by clinical assessment and objective monitoring (capnography).
- Failed laryngoscopy: Failure to achieve an adequate view of the laryngeal inlet / vocal cords.
- Failed intubation: Failure to pass an endotracheal tube into the trachea.

What the evidence says...

Out-of-hospital airway management has a profound effect on mortality and morbidity, and is a fundamental part of routine paramedic practice. Historically, ETI has been the cornerstone of invasive airway management by paramedics². However, recent research has questioned the value of this technique when performed by practitioners with comparatively less extensive training and relatively limited procedural exposure³.

A rapid evidence review was commissioned by the College in order to inform the consensus panel⁴. This evidence review specifically considered the question “how do paramedics learn and maintain the skill of tracheal intubation”.

Following a comprehensive search, review and critical appraisal process, 10 papers met the inclusion criteria for the review. These papers were comprised of nine papers that examined how paramedics acquire the skill of intubation, one paper that addressed intubation skill maintenance by paramedics and one study that attempted to address both. Papers came from a number of countries, including

seven from the United States, and one each from the UK, Canada, Australia and Japan. Publication dates for papers varied, with six published between 10-20 years ago, four published in the last 10 years and one paper published between 20-30 years ago.

The majority of papers (seven) were interventional in design, with two of these being randomised controlled trials. The remainders were observational. Studies that examined intubation attempts by paramedics as an outcome consisted of five that collected data on operating theatre intubations, four on manikin intubations-only, and two that had a focus on pre-hospital intubations.

As a result of the evidence synthesis of this rapid evidence review, the following observations were made:

1. In order to determine how paramedics learn and maintain the skill of intubation, a definition is required so it is clear what benchmark is to be used to state that a paramedic has 'learnt' the skill of intubation. This could be a single measure such as first-pass success of 90% for prehospital intubation, for example, or a range of measures, such as intubation success and complication rates, laryngoscopy technique and decision-making.
2. The precise number of intubations required to become proficient at intubation is not clear, but based on the evidence in the review, in order to achieve a first-pass intubation success rate of 90%, paramedic students require 25–30 intubations on live patients, preferably in a range of environments (e.g. commencing in operating theatres or other in-hospital settings and then out-of-hospital).
3. Intubation training should use a range of modalities, including didactic lectures, videos and practical sessions on airway manikins. Students should not be trained on only a single manikin, but should have access to multiple types. Supervision by experienced faculty is required.
4. Little is known about how paramedics maintain their skill in intubation, given the lack of clinical opportunity in some settings. Skill retraining can help with demonstrations/lectures by experienced faculty desirable on a yearly basis.

5. Further research is needed to understand how paramedics maintain their skill in intubation, given the limited opportunities to use the skill in a clinical setting and lack of opportunities with UK ambulance services for retraining.

A broader review of the evidence base was undertaken in order to include papers that explored airway management in practice.

A meta-analysis of prehospital airway management reported pooled procedural success rates for ETI of 86.3% (95% CI 82.6%-89.4%) for non-physician providers globally including paramedics⁵. Limited evidence exists in relation to UK paramedics, with retrospective reviews of ETI conducted in an ambulance service and air ambulance system reporting procedural success rates of 83.8% (n=368) and 97.3% (n=36) respectively. Some investigators report improved survival where ETI is performed by paramedics in cardiac arrest⁶, whereas others have observed increased mortality⁷. Other research suggests that the aetiology of the cardiac arrest⁸ or the sequencing of the procedure with other resuscitation tasks may be important factors in predicting the therapeutic value of ETI over other airway management approaches⁹. Levels of practitioner education, experience and procedural exposure are also likely to influence outcomes^{10, 11, 12}.

Laryngoscopy versus intubation

All paramedics must be proficient in the use of a laryngoscope and the technique of direct laryngoscopy with concomitant use of Magill forceps to facilitate the removal of a foreign body airway obstruction (FBAO). Laryngoscopy for airway clearance in cases of FBAO differs from laryngoscopy to facilitate passage of a tube into the trachea.

Should all paramedics intubate?

Significant ongoing clinical exposure is required to develop and maintain a high degree of skill and competence after completion of initial training in endotracheal intubation. It would be challenging in routine paramedic practice to receive the exposure required to facilitate maintenance of the required level of competence. With the availability of second-generation SAD, there is less of a requirement for the routine practice of intubation by all paramedics.

The College recognises that there is a need in employing organisations for specialist advanced airway support and recommends that employers should consider the selection of a smaller cohort of paramedics who can be provided with a higher level of training, supervised clinical practice and rigorous assessment of competence. These paramedics and the organisations in which they are employed, should be configured in such a way as to ensure that they are targeted to incidents appropriately, increasing the frequency of exposure to the skill in clinical practice and putting systems in place to allow for regular practice and reassessment of competence. It is acknowledged that system configuration will necessarily vary according to population demographics and geographical considerations. For example, rural services may require different approaches to ensure that intubation competent practitioners are universally available.

It is not the title of the role of an individual paramedic which defines if they should or should not be able to intubate. But the need that is required within that role for advanced airway management that should guide the skill set.

Standards of education and training

Laryngoscopy for the purposes of managing FBAO should remain a core skill and competency within all pre-registration paramedic training programmes. The skill of intubation should also continue to be taught as it is important that all paramedics understand the procedure and have the ability to undertake an assisting role; however there should be no formal assessment of competence prior to registration.

Pre-registration training must include teaching of non-technical skills relating to the team approach to intubation and the use of essential equipment including bougies and end-tidal carbon dioxide monitoring (EtCO₂). Post-registration training of paramedics permitted to intubate must include comprehensive training in failed intubation drills and consider the use of a wider range of tools designed to improve laryngoscopy in difficult cases. Post-registration education and training must also include complex decision-making in relation to the risk / benefits of intubation and team skills.

Where intubation is retained as a skill within an organisation, additional post-registration training, supervised practice and rigorous assessment of competence must be provided before paramedics

practice this procedure independently. A programme of on-going training and assessment must be included to ensure that paramedics remain competent following initial training.

Assessment of competence

There is significant variation within the evidence relating to the development of competence at intubation. Traditional paramedic training used a benchmark standard of 25 supervised intubations in a controlled, theatre environment. However, since the transition to HEI delivered paramedic training there is now no mandated national standard.

Assessment of competence needs to test the capability of paramedics in the psychomotor skills required to undertake safe and effective laryngoscopy, successful tracheal intubation and the essential non-technical skills pertaining to decision-making, risk assessment and leading the team involved. Assessment of competence should also include assessment of the paramedic's ability to systematically troubleshoot difficulties in obtaining a laryngoscope view and in the use of failed airway drills.

Whilst supervised practice in a controlled environment is essential in the development of competence, the use of high fidelity simulation allows the development of competence not only in the technical, but non-technical skills related to undertaking intubation and associated decision-making, particularly in the pre-hospital setting. Paramedics should expect to undertake 60 supervised intubations before being deemed competent, of which between 25-35 must be undertaken in a controlled setting (i.e. hospital anaesthetic room). High-fidelity simulation in a context-specific environment may also be utilised to achieve the remaining supervised intubations. Assessment of competence needs to include demonstration of safe practice in managing complications and in the use of failed airway drills.

Following an initial assessment of competence all paramedics who undertake intubation must maintain a log of all intubation attempts, including training and simulation in addition to operational practice. A minimum of 2 intubations per month should be logged, for each patient age group for which intubation is permitted (i.e. infant, child, and adult), these can be in actual clinical practice or in high fidelity simulation. Where possible, at least one of these per month should also include not only the technical skill but should also seek to practice the non-technical team skills and clinical decision-making. Airway logs should allow for the recording of information about the circumstances of the case

and should record aspects of decision-making and reflection on both the technical and non-technical skills used.

Annual refresher training and assessment of competence must take place and should include high-fidelity simulation that facilitates assessment of both technical and non-technical capabilities. Formal review of airway logs should also be undertaken as part of the annual review process, by a clinician with responsibility for supervising practice within the organisation.

Standards of equipment

It would not be appropriate for this consensus statement to mandate the type and volume of equipment that organisations should provide to its paramedic workforce to allow intubation to be undertaken, beyond stating that the provision and use of a bougie and EtCO₂ monitoring are mandatory minimum standards that should be used routinely by all paramedics continuing to intubate.

Organisations should also consider the provision of and training in, additional methods designed to improve the safety of intubation such as the use of prism and video laryngoscopes and should also include equipment and training necessary to facilitate rescue airway drills.

Clinical governance

Every organisation retaining the skill of intubation within its paramedic workforce must ensure that robust systems of clinical governance are in place. These systems must include the following minimum components;

- A named clinician with lead responsibility for the practice of intubation by paramedics.
- A clearly defined clinical governance policy and framework that outlines the systems in place to monitor and assure on the quality and safety of practice.
- Regular audits of mandatory capnography use including the feedback mechanism to staff
- Robust policies, standard operating procedures, guidelines and the provision of checklists.
- Defined standards of practice, supported by a robust system of data capture and clinical audit which must include the mechanisms by which audit findings will be addressed.

- Defined processes for education, training and assessment of competence and the processes in place for maintenance and reassessment of competence.
- Education and training of staff undertaking support roles, such as the airway assistant role.
- Defined standards of those undertaking supervisory roles and processes for managing performance and capability issues.
- A deployment strategy that appropriately targets trained individuals to incidents exposing them to the use of intubation in practice.
- Standardised equipment which must include the provision of bougies, waveform capnography and any other items deemed necessary to maintain safe systems of work.
- Defined processes for adverse event and incident reporting and how the learning from such events is translated into operational practice.

Intubation in children

Endotracheal intubation (ETI) in children was discussed as part of the development of this consensus statement. ETI in children is rarely performed by Paramedics which will make it difficult to achieve initial competency, or maintain competency throughout a career.

For children requiring airway management, the focus should be on providing high quality essential airway management and delivering a high level of oxygen. This can be achieved with positioning, simple adjuncts, supraglottic airway devices and a bag-valve-mask. Should an advanced airway be required, the practitioner must be competent in performing the skill and meet the expectations set out in this consensus statement.

A systematic review is currently underway into the subject of paediatric out-of-hospital airway management and relevant findings will be incorporated into a revision of this consensus statement once published. A consensus statement on paediatric airway management has been discussed and may be published in the future.

Pre-Hospital Emergency Anaesthesia (PHEA) and paramedics

This consensus statement only addresses the issue of paramedic intubation without the use of pharmacological support. PHEA is an area of practice that cannot be addressed within this consensus statement; however it is acknowledged that is an area of pre-hospital clinical practice that requires further future consideration.

Summary and Conclusion

Endotracheal intubation has for many years been the cornerstone of airway management by paramedics, however the development of supraglottic airway devices has reduced exposure to the use of this skill in practice, raising concerns over its continued practice.

There is currently significant variation in the standards of training, assessment of competence and the provision of equipment to facilitate endotracheal intubation, with no nationally agreed standard. There are also no formal standards regarding the continuing assessment of competence.

Laryngoscopy and the concomitant use of Magill forceps remains a core skill for all paramedics in the management of FBAO, however the continued practice of ETI by all paramedics would be hard to defend in the current circumstances.

Organisations and services with an ongoing need to maintain the availability of endotracheal intubation should consider the selection and training of a smaller cohort of paramedics, who should receive more extensive training and more rigorous assessment of competence and should be configured and deployed in such a way as to target them to incidents increasing exposure to the use of the skill in practice. Where intubation is retained, organisations must ensure that they have appropriate clinical governance processes in place to support this activity, with a named individual identified as accountable for clinical practice and that robust process are in place for the audit and review of practice and the maintenance of competence of staff.

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